

Thin Thread Analysis

Ver 1.2

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Overview



- **NCOE Background**
- **The Need to Close a Potential Analytical Gap**
- **Purpose of Thin Thread Analysis**
- **The Architecture-Based Thin Thread Approach**
- **Initial Development of the Thin Thread**
- **Results to Date**

Background



- **NCOE study - two parallel tasks done in FY05 under accelerated timelines**
 - **Task 1 – Joint Integrating Concept (JIC) development**
 - **Task 2a – NCOE Baseline and Roadmap**

Background – the NCOE JIC



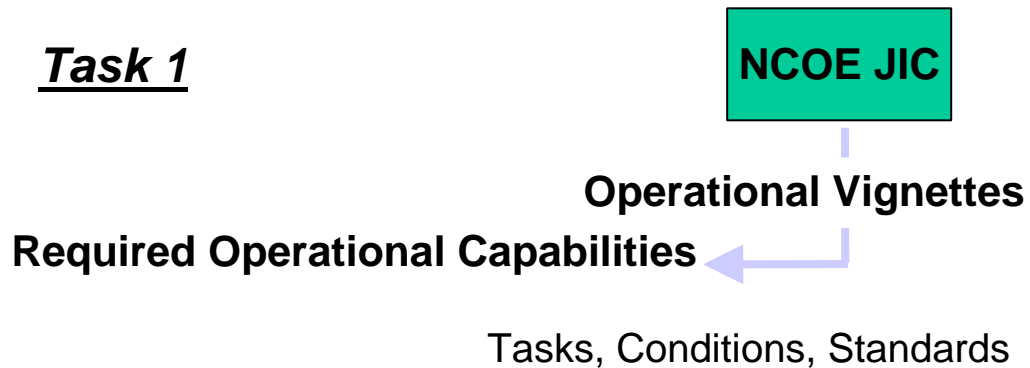
- **Focuses on Joint Task Force (JTF) operations within the context of a Major Combat Operation (MCO)**
- **Defined three interrelated capability areas**
 - Knowledge Management
 - Network Management
 - Information Assurance
- **Defined three enabling constructs**
 - Information Transport
 - Enterprise Services
 - Applications
- **Used illustrative examples to explore ideas**

Background - the NCOE Baseline & Roadmap

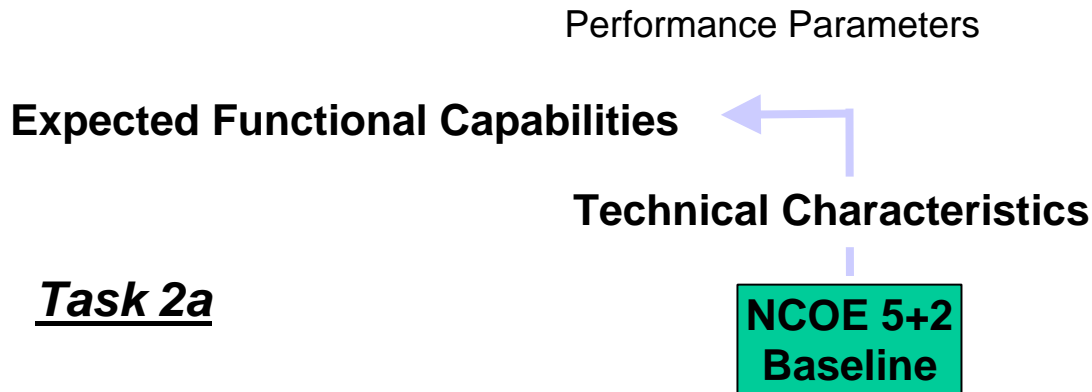
- **Description of the DoD's Net-Centric Vision**
- **Summary of the principal components that are being developed to enable achievement of the vision**
 - **Transport (Communications)**
 - **Network Management**
 - **Enterprise Services**
 - **Information Assurance (IA)**
- **Programmatic and technical interdependencies among the NCOE programs and initiatives**
- **Descriptions of capabilities expected to be available to selected types of users between FY08 and FY20**

The Need to Close a Potential Analytical Gap

Task 1



How do we compare these?



Task 2a

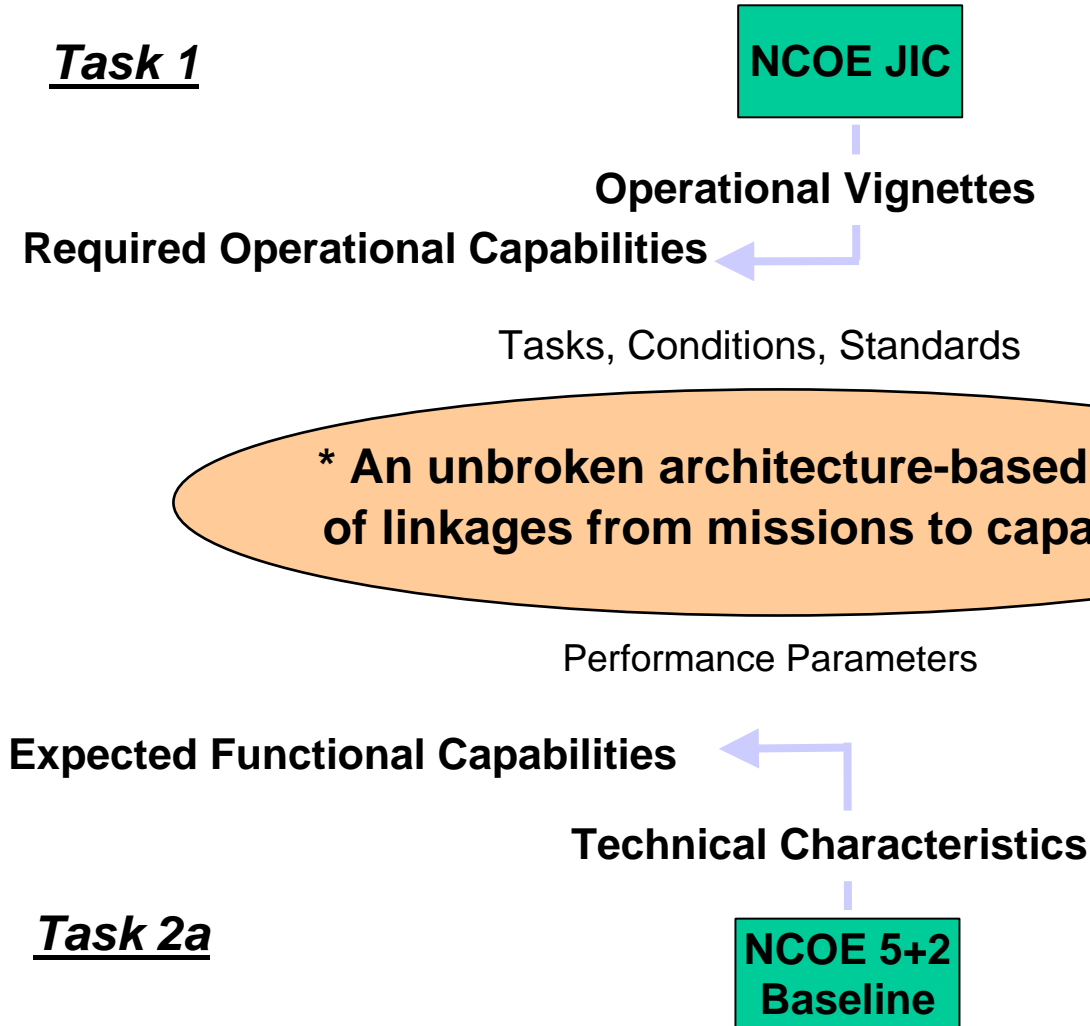
Source: MITRE Briefing to ASD (NII) 24 Jan 2005

The NCOE Capabilities Based Analysis

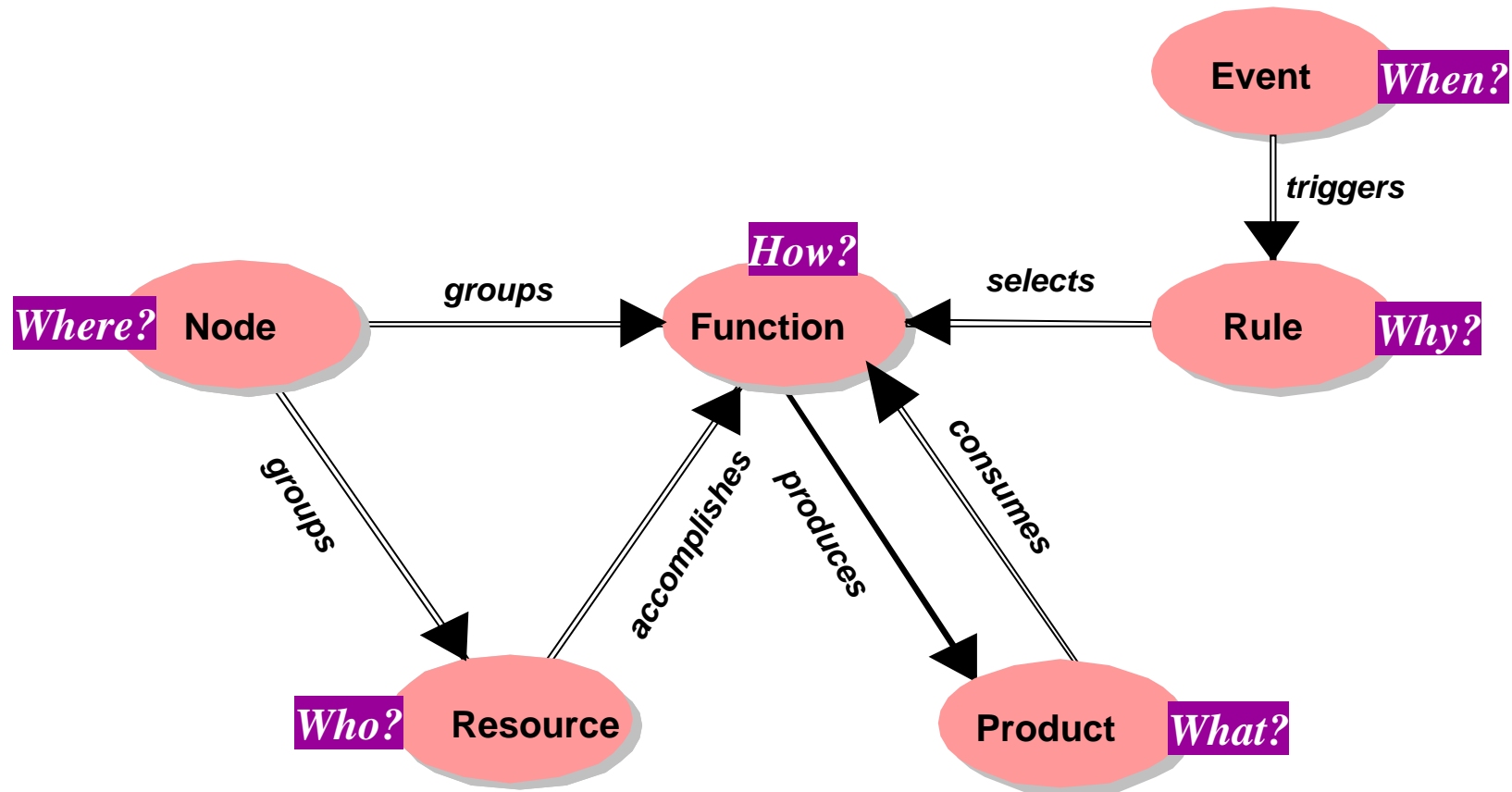


- **NCOE Capabilities Based Analysis (CBA) planned for FY06**
 - Conduct Functional Area Analysis (FAA)
 - Conduct Functional Needs Analysis (FNA)
- **MITRE tasked to use existing materials to define a process and demonstrate results**
 - Use existing NCOE JIC materials
 - Focus on Time Sensitive Targeting process
 - Augment information with extant materials from Joint Battle Management Command and Control (JBMC2) Roadmap

An Architecture-Based “Thin Thread”*

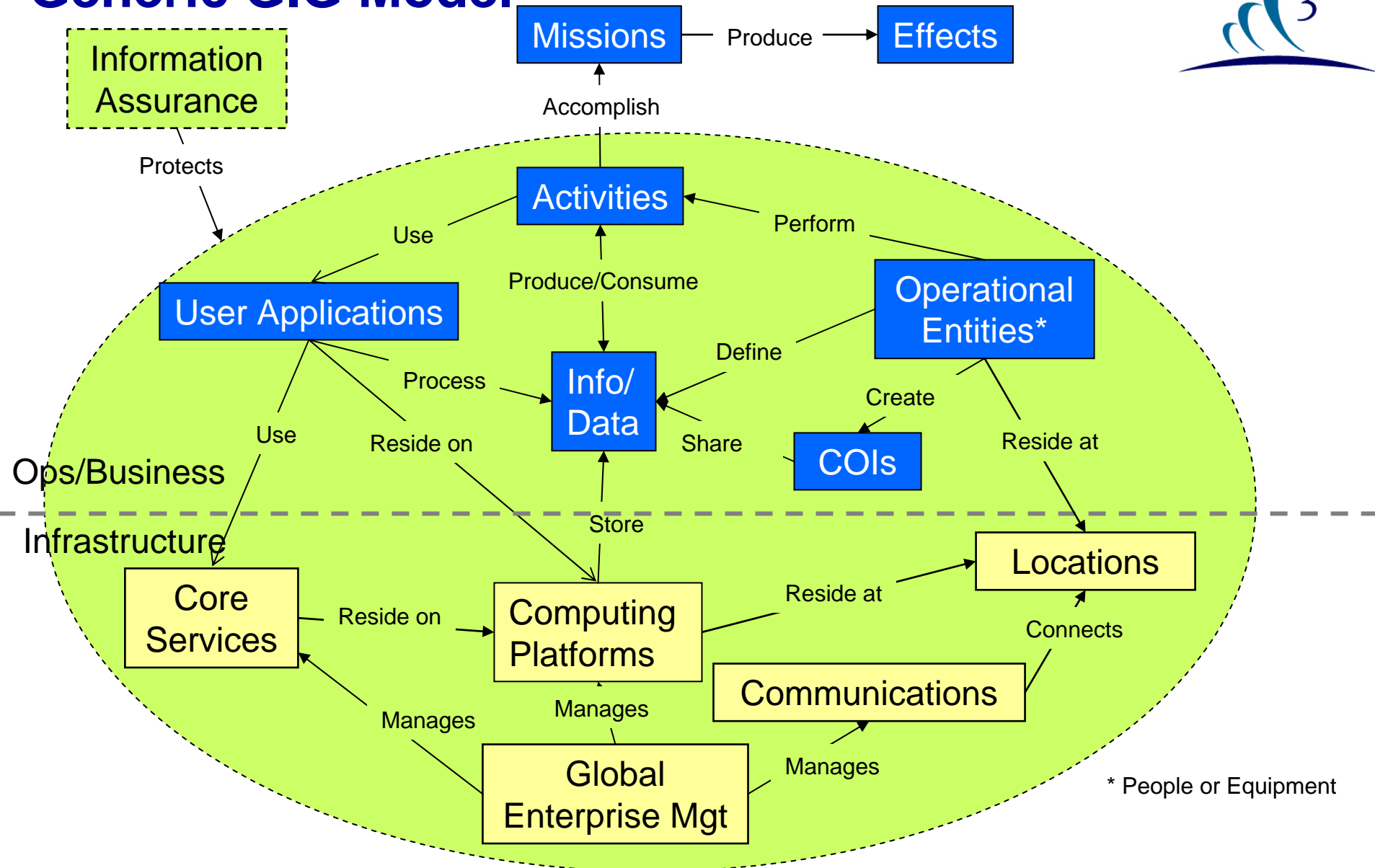


Architecture Specification Model (ASM) Overview*

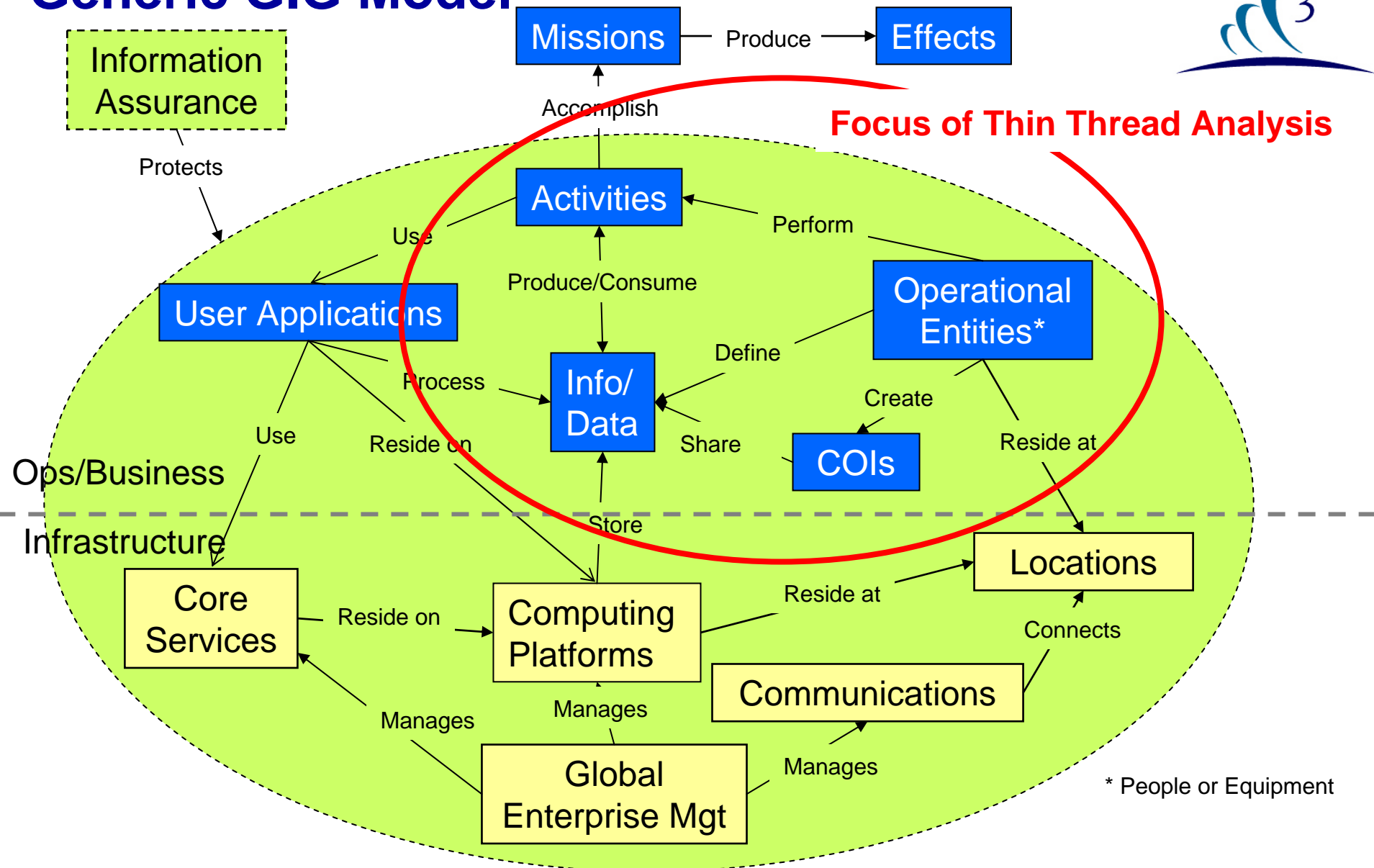


* ASM Developed by MITRE under USAF Sponsorship

Generic GIG Model



Generic GIG Model



Needs are Driven by Operational Characteristics

■ Activity

- Operational Role – what activities are performed?
- Criticality – how important are the activities?
- Precision – how accurate do the result of the activity need to be?
- Knowledge – what information is needed to accomplish the activity?
- Tempo - how often is the activity performed?
- Timeliness – how fast is the activity performed?
- Operational Security – how much does it need to be protected?

■ Operational Entity

- Organizational affiliation – who are they?
- Physical Location – where are they located?
- Environment – what kind of conditions prevail or are possible?
- Degree of mobility – how much do they move?

■ Community of Interest

- Community affiliations – what COIs are involved?
- Vocabulary – what “language” do they speak?



■ Information

- **Existence** - has anyone created the information?
- **Content** – what is the substance of the info (intel, ops, weather, logistics, etc.)?
- **Currency** – when was it created or last updated?
- **Perishability** – what is the “shelf life” of the information?
- **Availability** – can it be physically obtained?
- **Format** – what form is it in (text, audio, video, imagery, etc.)
- **Discoverable** – is it tagged and indexed so it can be readily found?
- **Accessibility** – is interaction with it possible and allowed?

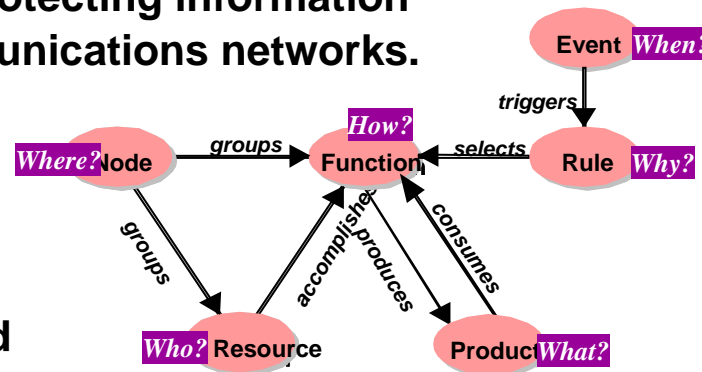
Architecture-Based Linkages for TST



F2T2EA **functions** include locating and identifying targets, determining, analyzing and preparing plans of attack, selecting best courses of action, engaging the targets, and evaluating the results; as well as supporting functions such as protecting information and managing communications networks.

In response to an **event**, a need to defend friendly forces from attack, triggers a response.

Predefined **rules** (e.g., in an SOP) are invoked to select the F2T2EA chain of activities.

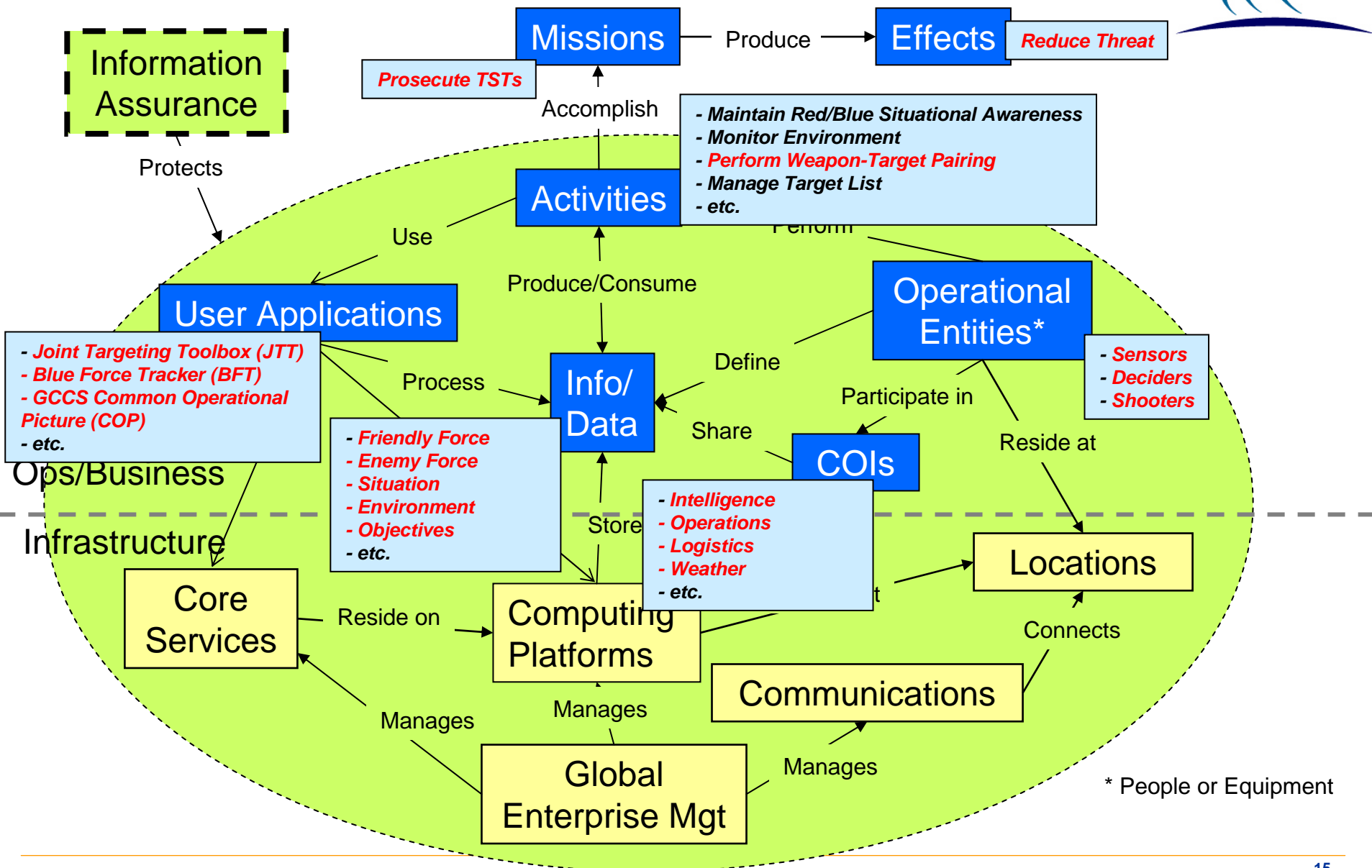


Participating **nodes** include sensors, decision-makers, and shooters; as well as network managers.

Products include orders of battle, target coordinates, weather reports, terrain descriptions, engagement orders, combat reports, etc.

Resources employed include ISR sensors, C2 platforms, combat vehicles and weapons, and the supporting communications, computing, security, and network management infrastructure.

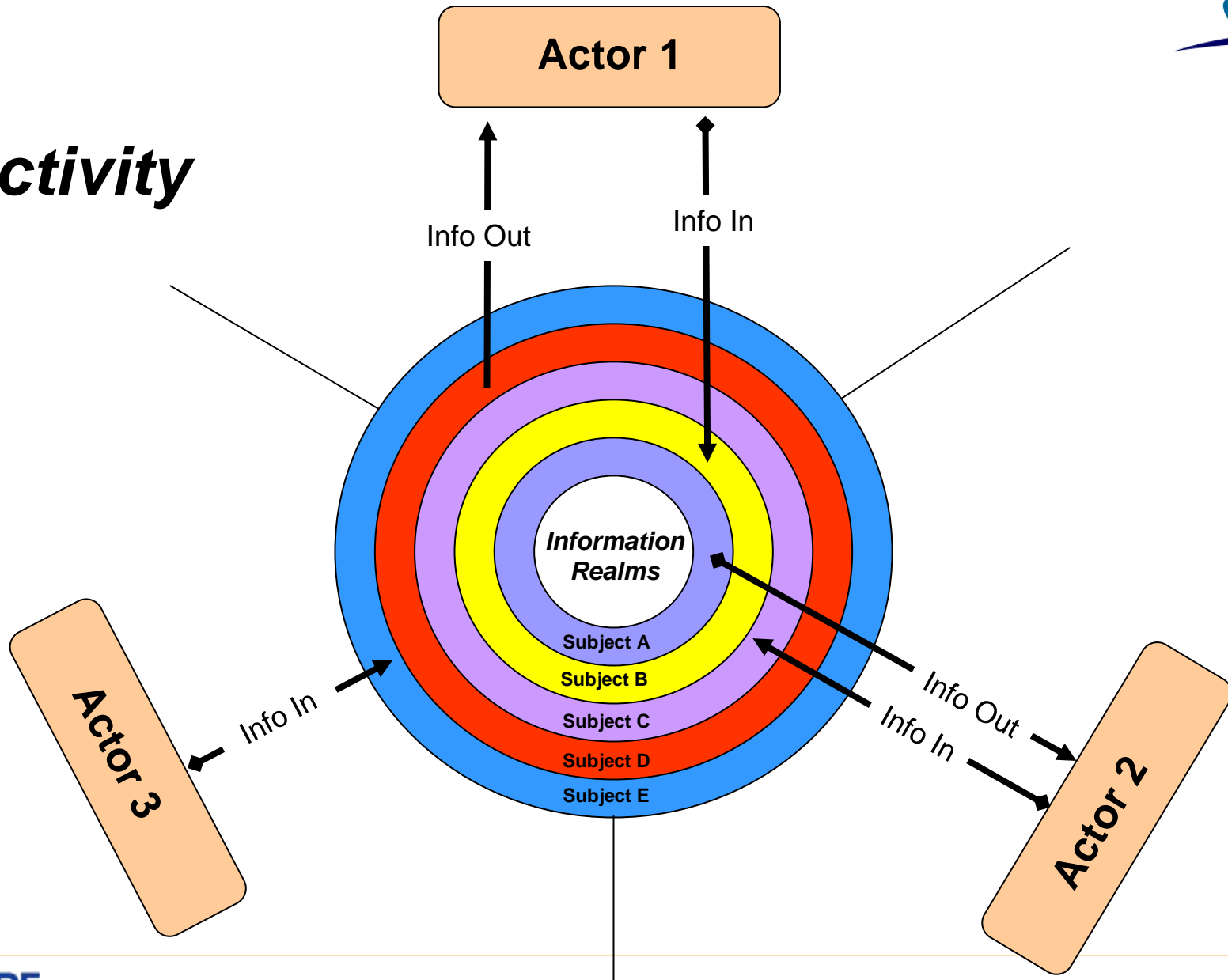
NCOE-Relevant Thin Thread Operational Elements



Activity-Based Net-Centric Diagram (OV-X)



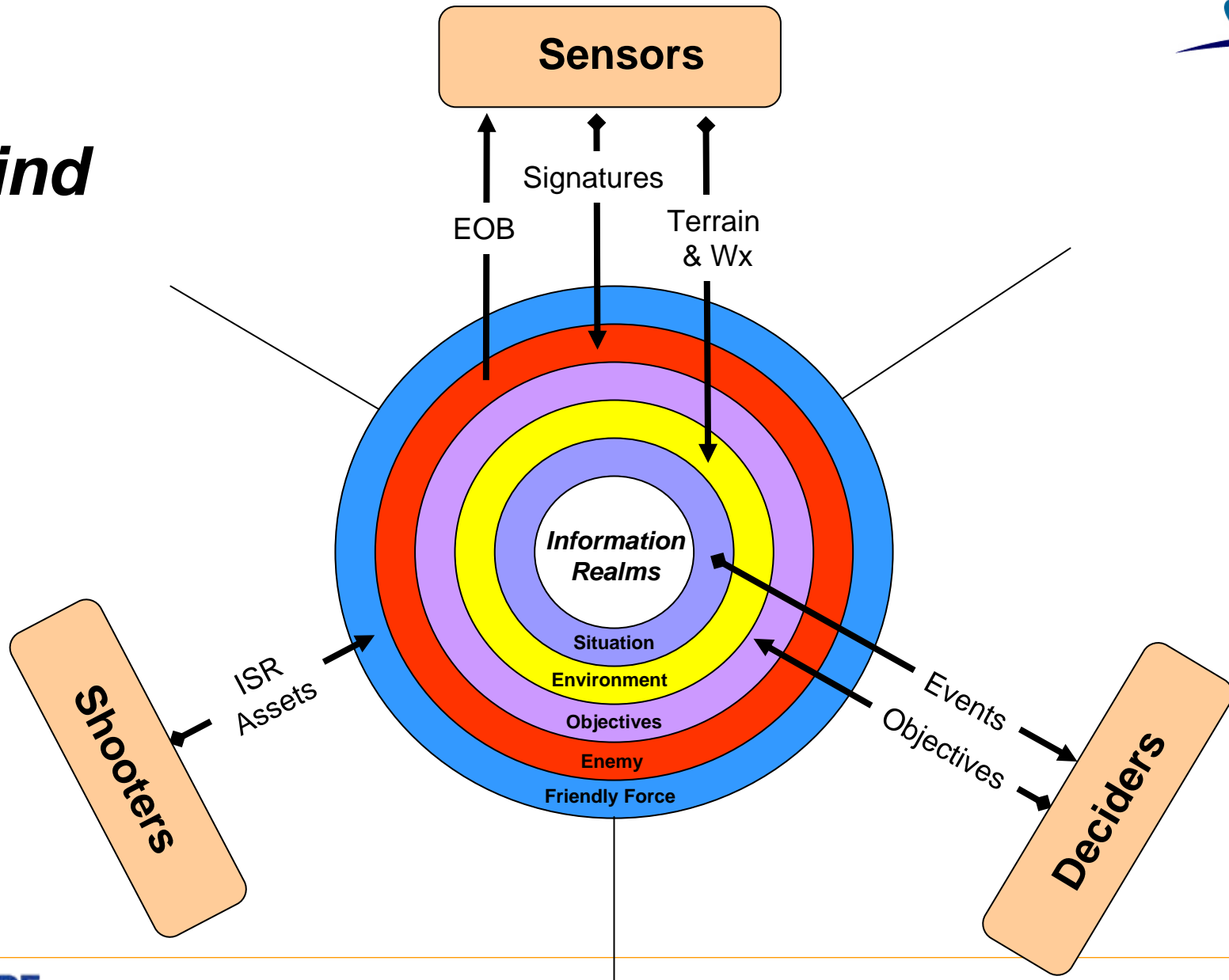
Activity



Notional Activity-Based TST OV-X



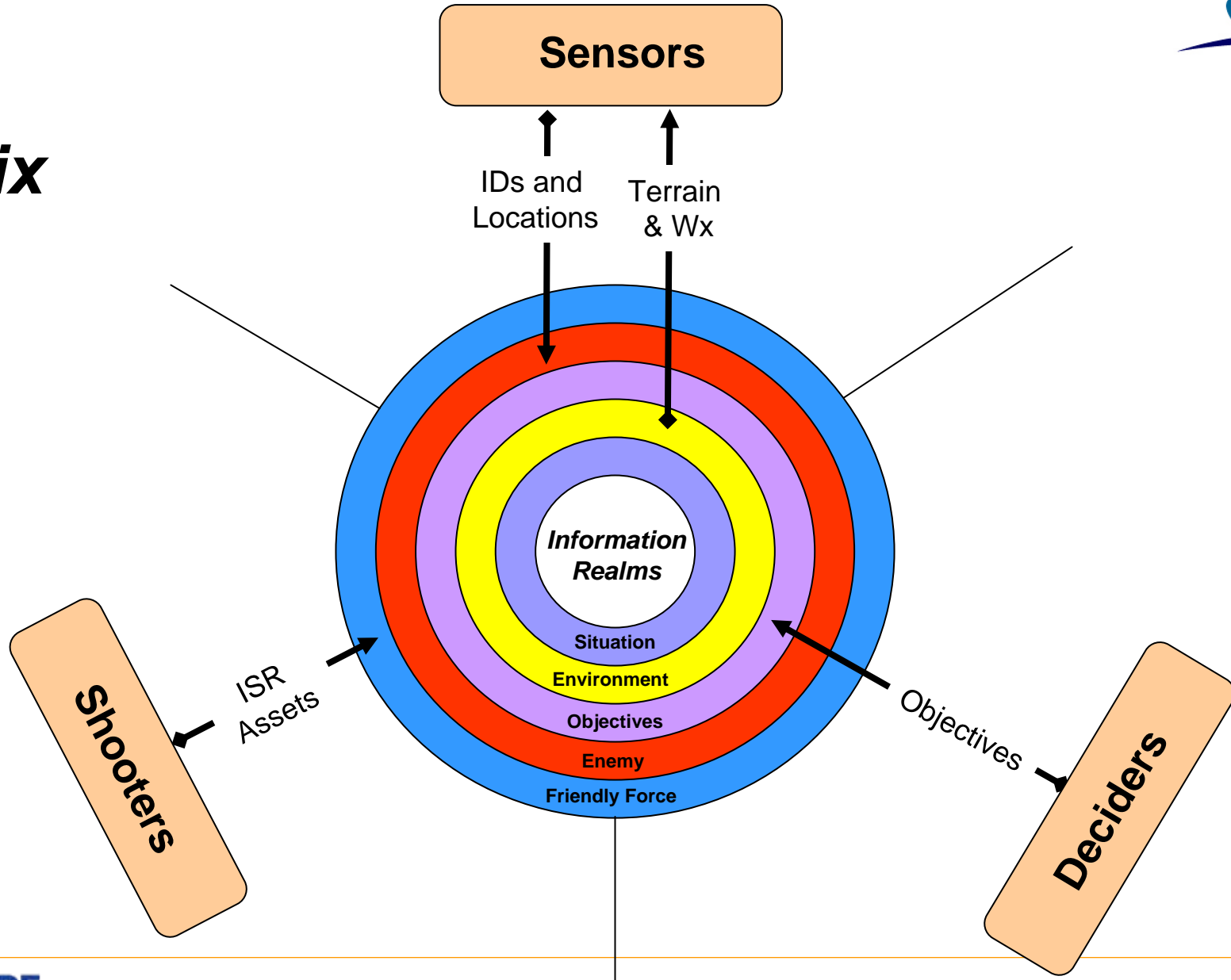
Find



Notional Activity-Based TST OV-X



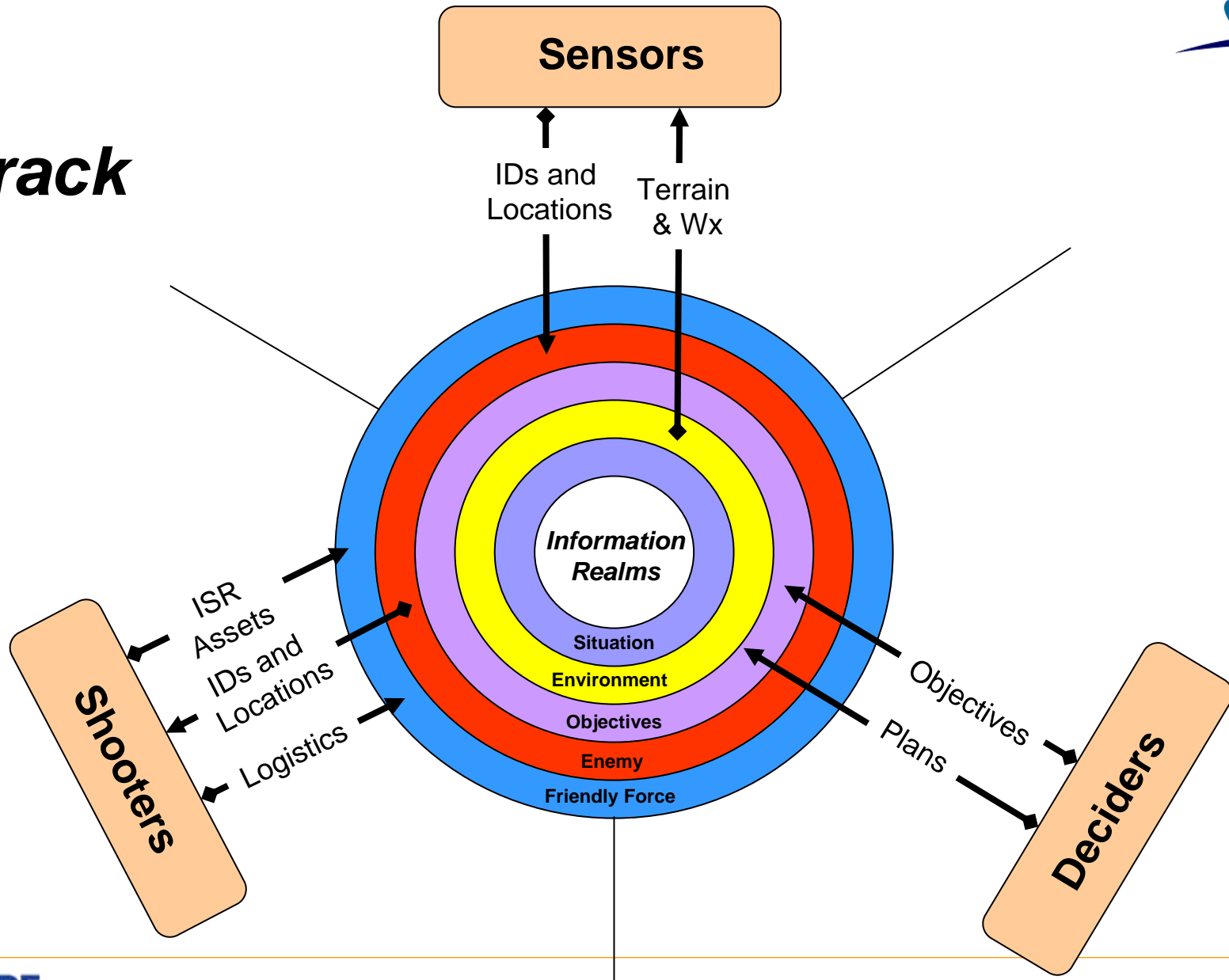
Fix



Notional Activity-Based TST OV-X



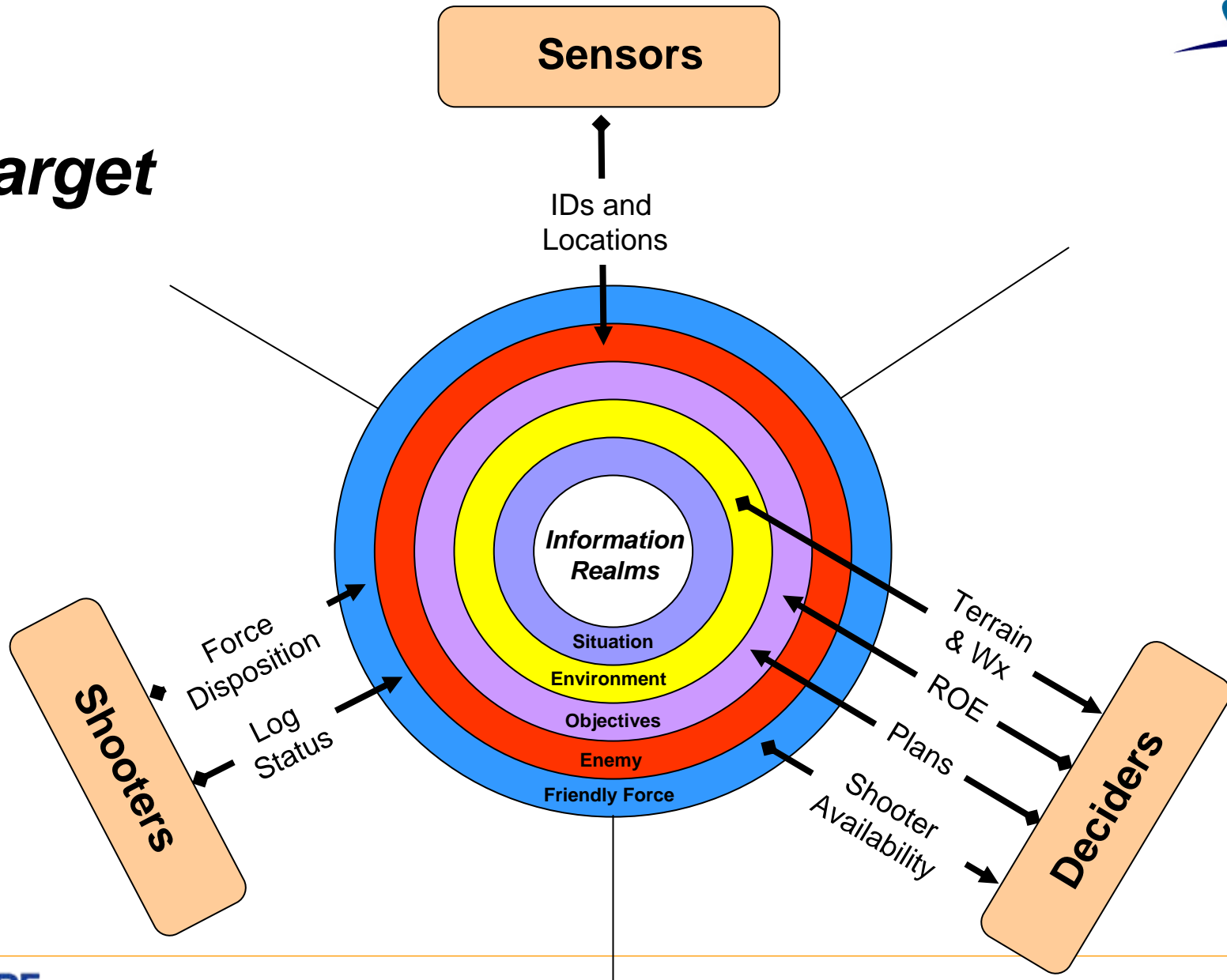
Track



Notional Activity-Based TST OV-X



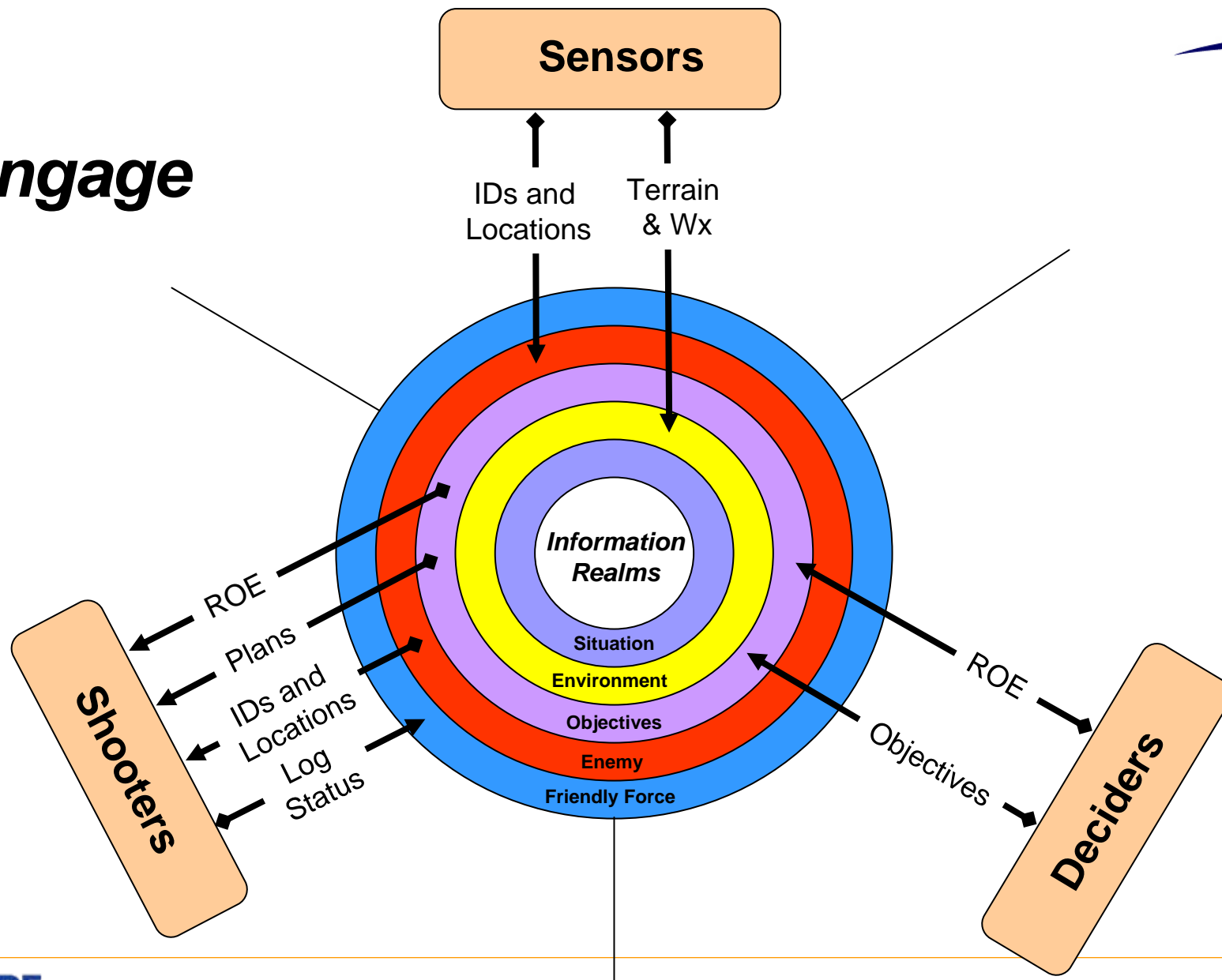
Target



Notional Activity-Based TST OV-X



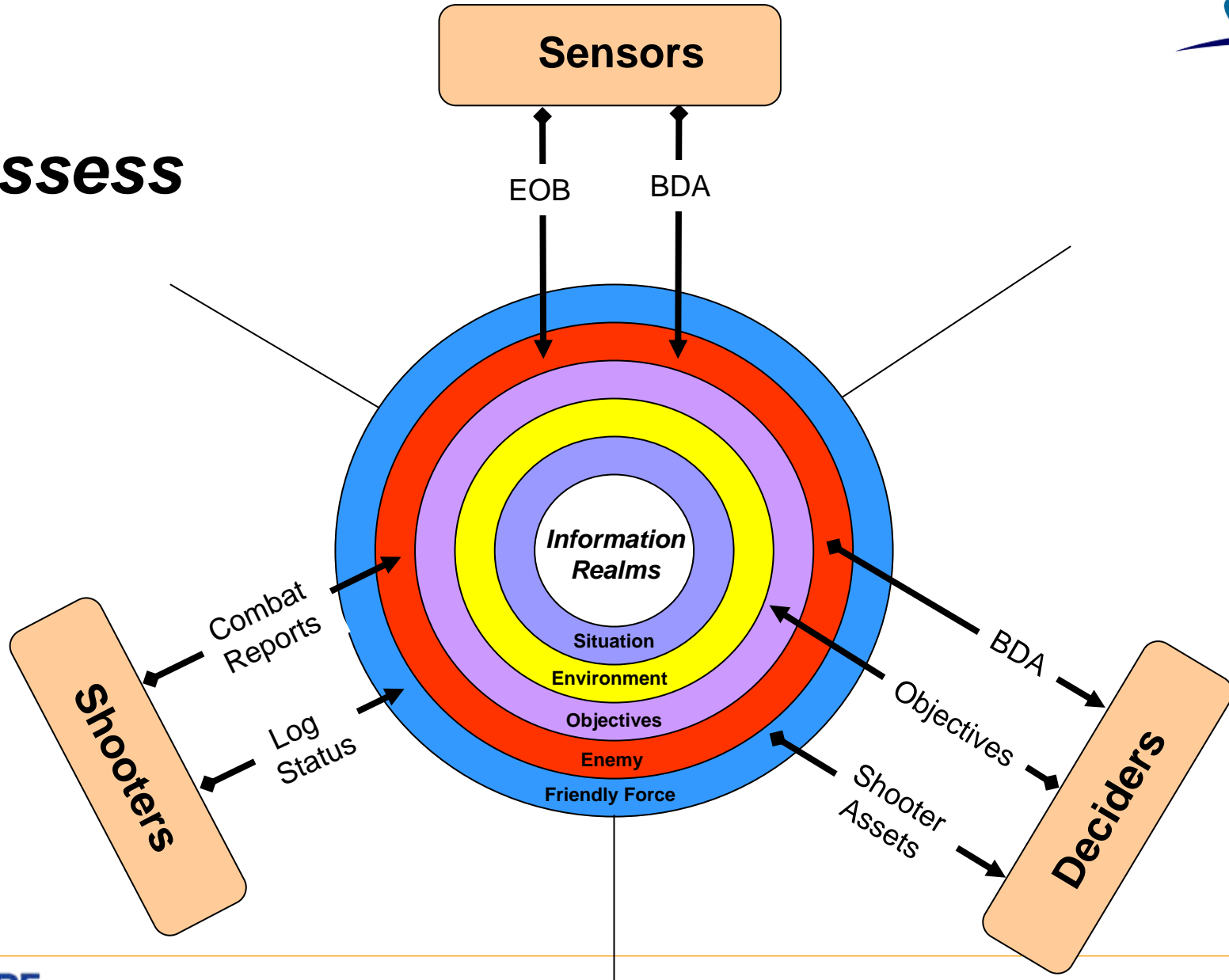
Engage



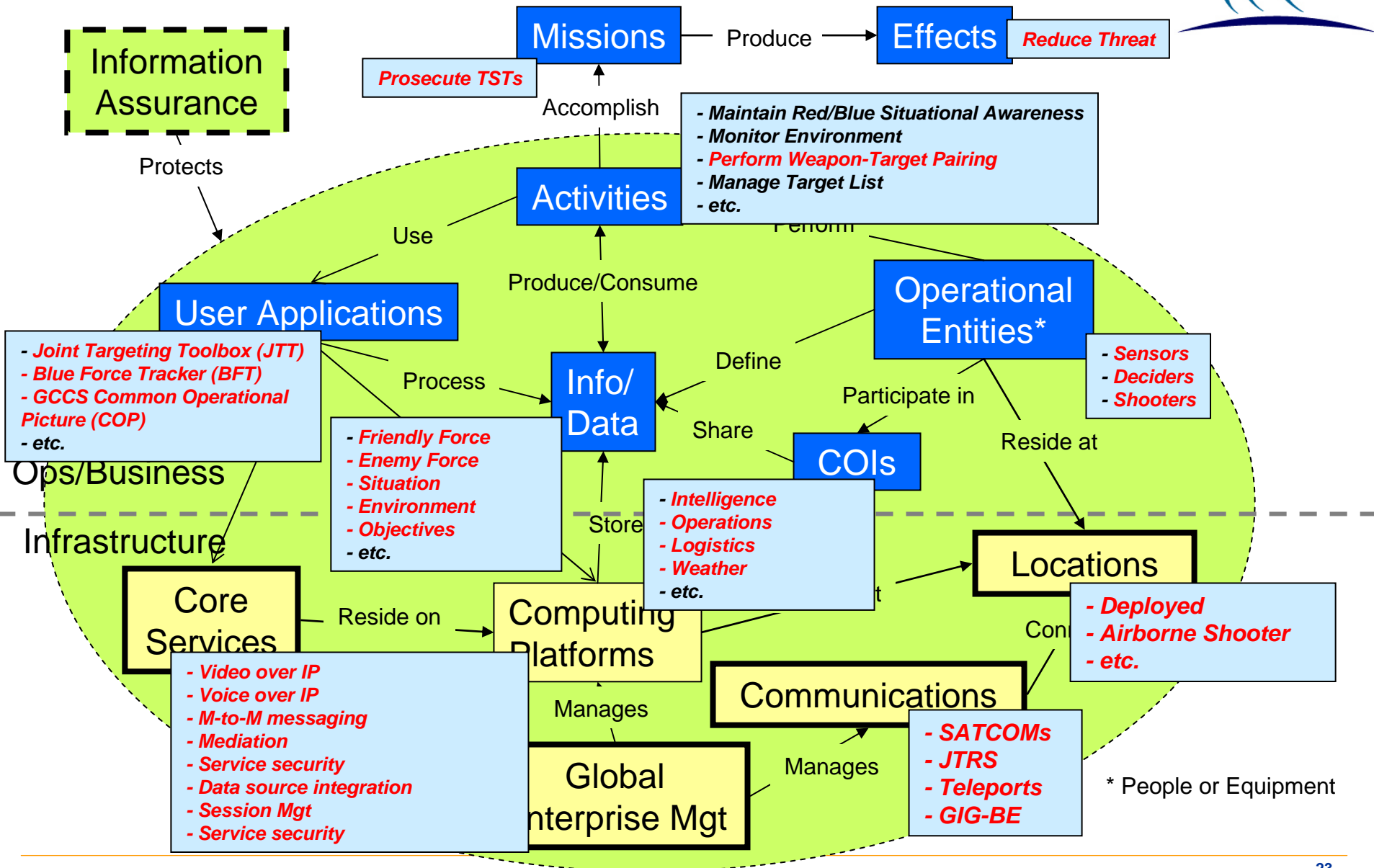
Notional Activity-Based TST OV-X



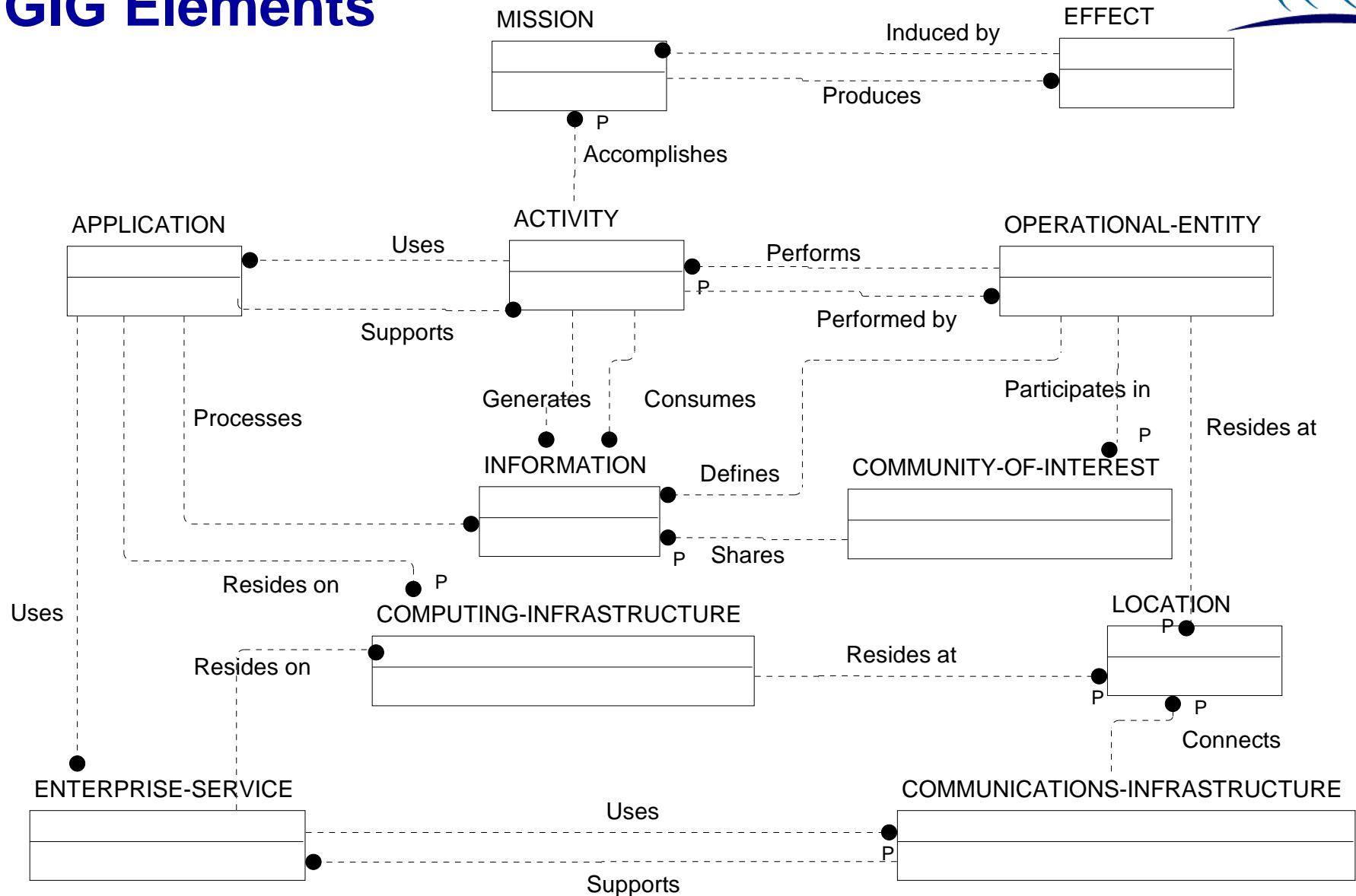
Assess



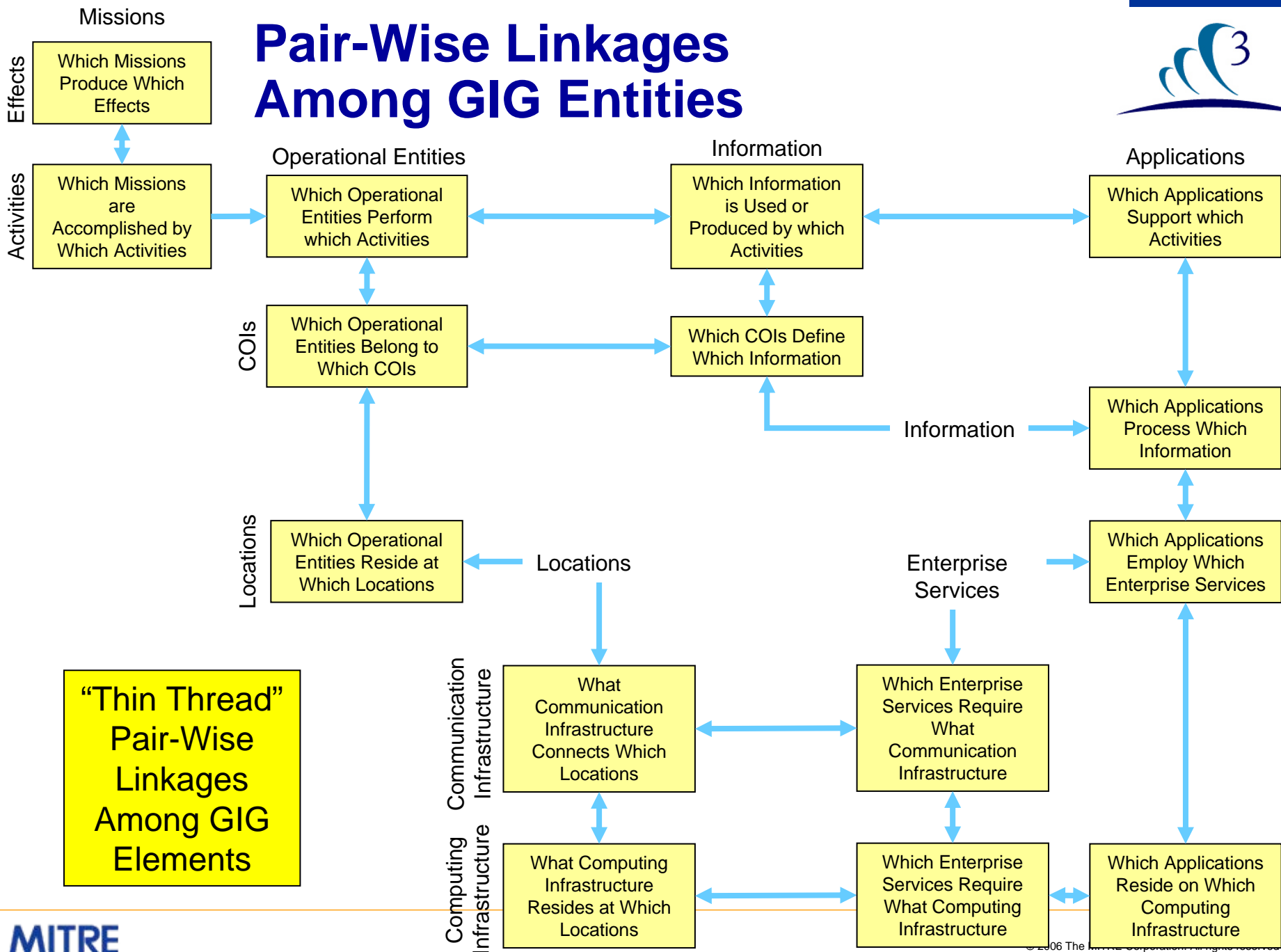
NCOE-Relevant Thin Thread Operational and Infrastructure Elements



Entity Relationship Model of Selected GIG Elements



Pair-Wise Linkages Among GIG Entities



**“Thin Thread”
Pair-Wise
Linkages
Among GIG
Elements**

Sample TST Thin Thread Linkages



| Missions | | | | | | | | | |
|------------|--|---------------|--|--|--|--------|---------|---------|--|
| Effects | Which Missions Produce What Effects | Prosecute TST | | | | | | | |
| | Reduce Threat | X | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Missions | | | | | Operational Entities | | | | |
| Activities | Which Missions are Accomplished by What Activities | Prosecute TST | | | Which Operational Entities Perform What Activities | Sensor | Decider | Shooter | |
| | Find | x | | | Find | | | | |
| | Fix | x | | | Fix | | | | |
| | Track | x | | | Track | | | | |
| | Target | x | | | Target | | | | |
| | Weapon-Target Pairing | x | | | Weapon-Target Pairing | | | | |
| | Determine Desired Effects | x | | | Determine Desired Effects | | x | | |
| | Determine Constraints | x | | | Determine Constraints | | x | | |
| | Determine Target Vulnerability | x | | | Determine Target Vulnerability | x | | | |
| | Select Weapon | x | | | Select Weapon | | x | | |
| | Determine Shooter Availability | x | | | Determine Shooter Availability | | x | x | |
| | Select Shooter | | | | Select Shooter | | x | | |
| | | | | | | | | | |
| | Engage | x | | | Engage | | | | |
| | Assess | x | | | Assess | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

NCOE Thin Thread Results



- Existing TST materials in JIC and in JBMC2 Roadmap provided insufficient level of detail to adequately exercise the concept
- Insufficient time and resources to gather additional information
- Only a Few Characteristics Could be Addressed
 - Activity operational role – what activities are performed?
 - Operational entity organizational affiliation – who are they?
 - Operational entity physical Location – where are they located?
 - Information availability – can it be physically obtained?
- Joint Staff chose to discontinue funding of NCOE Thin Thread effort
 - Considered the architecture-based approach to be too time consuming to pursue



Questions?